

Future Monitoring, Results, and Reports...

VIRTUAL FISH

In 2003, DEQ collected data to assess water column toxicity) at 44 stations using Semi-permeable Membrane Devices (SPMDs) or "Virtual Fish." This work was accomplished through a grant from the EPA and chemical analyses are being conducted by the USGS. Each device consisted of five plastic strips filled with a synthetic fish oil suspended within a minnow trap sized cage and was left in the stream for approximately 30 days in order to accumulate any potential hydrophobic substances.



Set-up and deployment of an SPMD.



Thalweg depth measurements.

RELATIVE BED STABILITY

In 2003, DEQ incorporated modified EMAP methods to collect data for relative bed stability calculations. This data should determine which streams have a "natural" sediment load versus those that have excessive sediment due to anthropogenic sources.



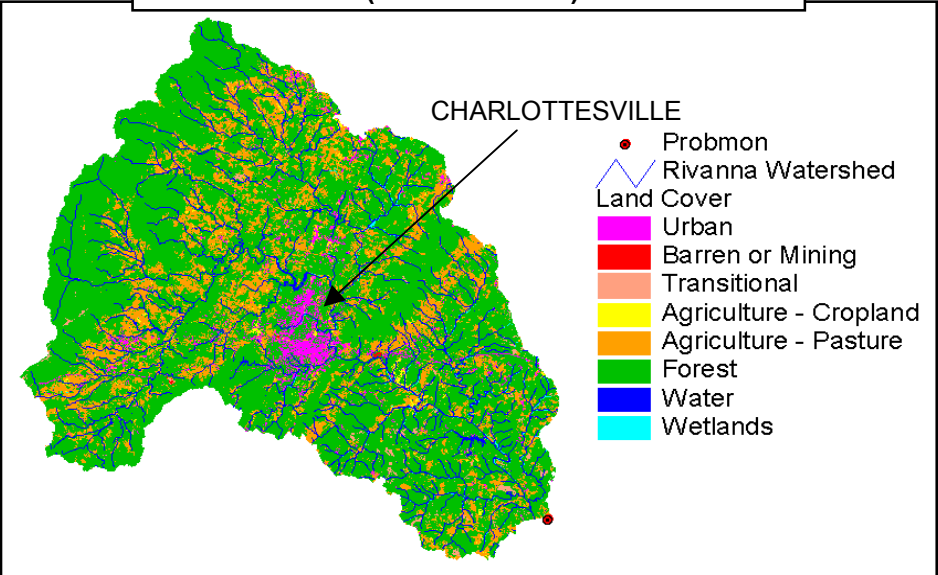
Measuring slope with a water level.

LANDUSE

Watershed delineations using GIS are being incorporated to determine the amount and types of land cover in the watersheds upstream of all monitoring stations. This data can be used to relate landuse to water chemistry, macroinvertebrate communities, and available habitat.



Landuse Coverage of 2-RVN012.15 (Rivanna River)



For more information on Virginia's Probabilistic Monitoring Program, contact Jason Hill with DEQ at (540) 562-6700 or email jrhill@deq.state.va.us, or search the DEQ website at www.deq.state.va.us/water.

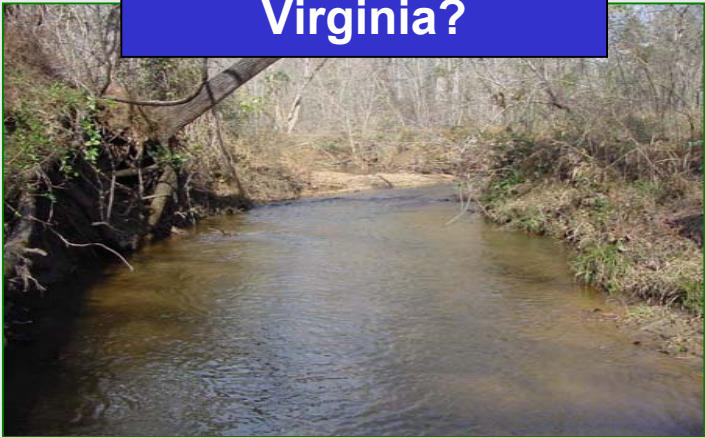


Virginia's Probabilistic Monitoring Program for Wadeable Streams: Year 3 Update

What is ProbMon?

In order to answer the question, "how good is the general water quality in the Commonwealth?", the DEQ initiated a probabilistic monitoring and assessment program in 2001 that employs a randomized station sampling design. The results provide statistically-based information for all non-tidal perennial streams in Virginia. The 2001 ProbMon report can be accessed at: <http://www.deq.state.va.us/water/probmon.pdf>

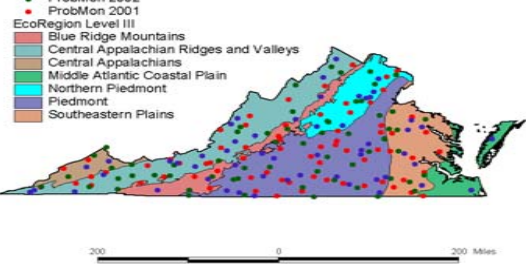
How good is the water quality in Virginia?



Methods

Chemical data was collected one time at each station. For 2001, the chemical samples were collected in the fall; whereas samples were collected in the spring for 2002-03. DEQ Standard Operating Procedures were used in the field and samples were analyzed by the Division of Consolidated Laboratory Services in Richmond, VA. All benthic macroinvertebrate samples were collected in the spring using the EPA RBPII (Mountains and Piedmont) and MACS (Coastal Plain and Southeastern Plains) methods. Habitat data was collected in the spring using the RBP visual survey methods.

Spatial Distribution of Station Locations from 2001-2003



Station Locations

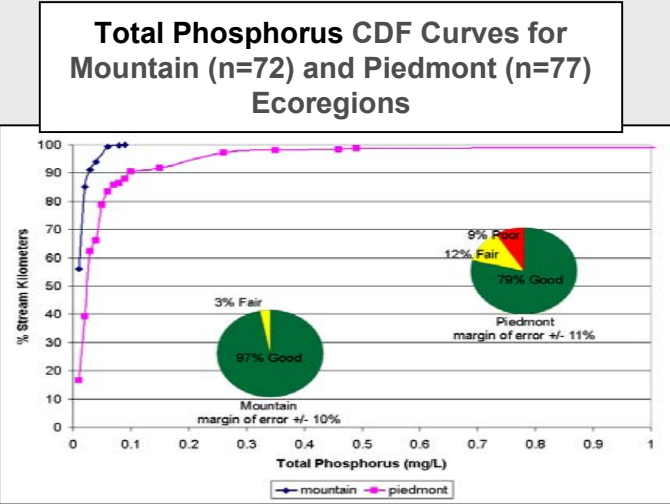
ProbMon coverage over the first three years includes data from 173 individual stations throughout the Commonwealth. Virginia has three distinct geographic regions. Of these, 77 stations were located in the Piedmont, 72 in the Mountains, and 24 in the Coastal Plains. Ecoregions were grouped as follows: Piedmont = Piedmont and Northern Piedmont; Mountain = Central Appalachians, Central Appalachian Ridges and Valleys, and Blue Ridge Mountains; Plains = Mid-Atlantic Coastal Plain and Southeastern Plains.



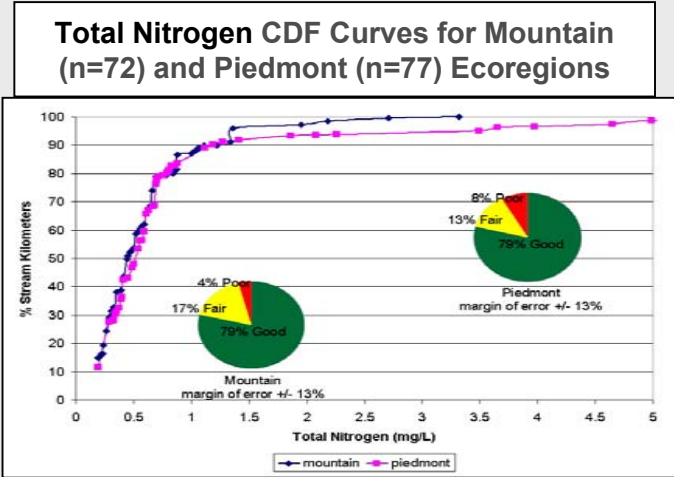
Results

NUTRIENTS

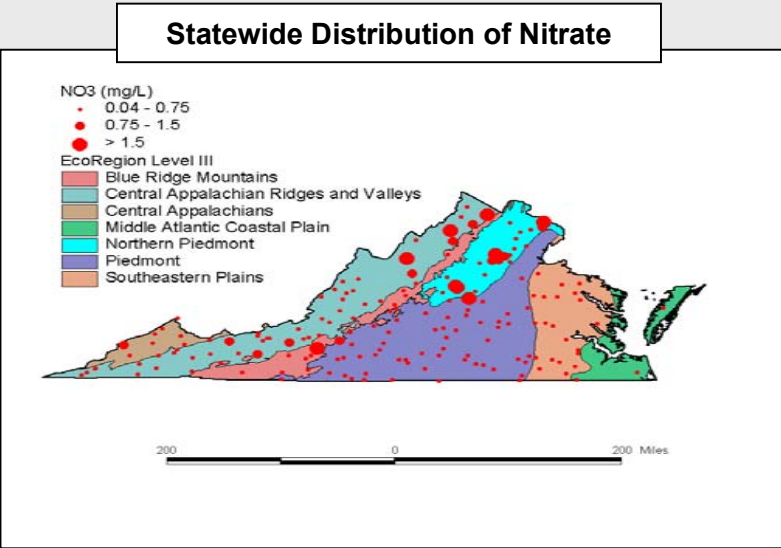
Nutrient enrichment can be a result of runoff from non-point sources such as farms and lawns in developed areas. It can also come from municipal and industrial point sources. Streams with excessive nutrients and adequate sunlight will have higher than normal algal growth. If algal growth is excessive, dissolved oxygen can be depleted during the night and when plants decompose, resulting in impacts to aquatic biota such as fish and benthic macroinvertebrates.



Total phosphorus concentrations were low (<0.05 mg/l) for most streams surveyed in both the Mountain and Piedmont ecoregions. Only 3% of the Mountain stream kilometers had moderate levels (0.05 - 0.1 mg/l) of total phosphorus; whereas, 21% of Piedmont stream kilometers had moderate-to-high levels.



Total Nitrogen concentrations were low (<0.75 mg/l) for most streams surveyed in both the Mountain and Piedmont ecoregions. The CDF curves show a similar trend between the two regions with Piedmont streams having more occurrences of high total Nitrogen concentrations (>1.5 mg/l).



Spatial distribution of nitrate shows the majority of streams with higher levels are in the Northern Piedmont and northern section of the Central Appalachian Ridges and Valleys. These two areas are potentially impacted by urban/suburban development and agriculture, respectively.

Results

HABITAT CONDITION

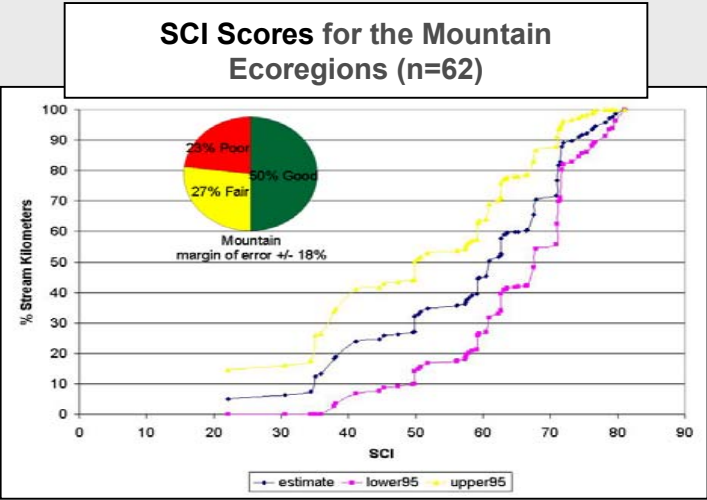
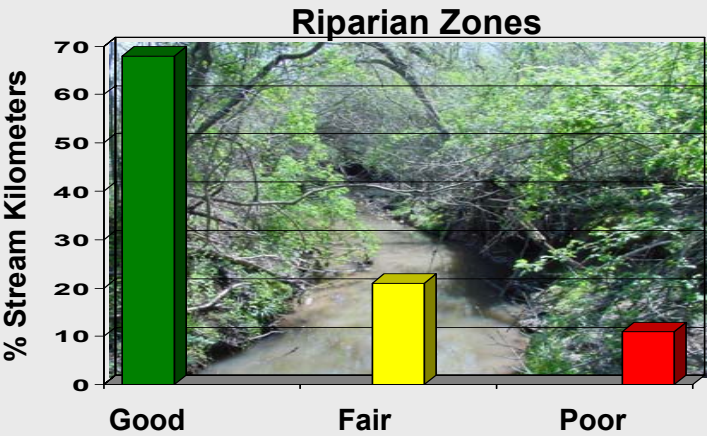
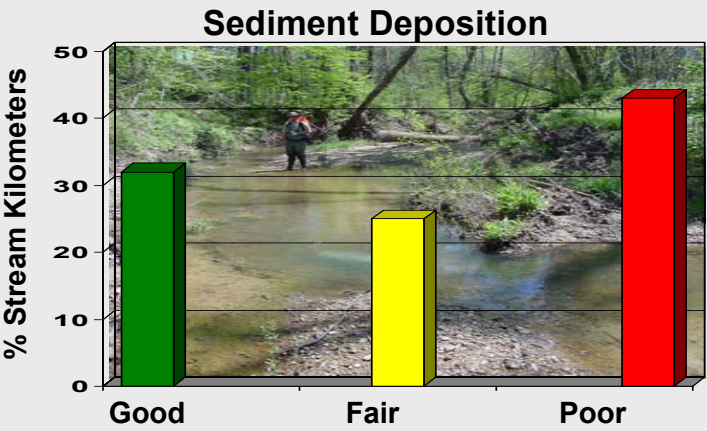
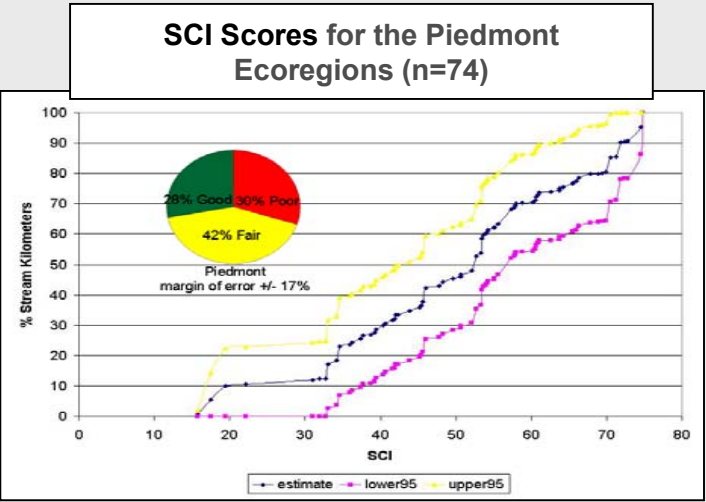
Total Habitat scores can range from 0 to 200. Only 5% of the estimated stream kilometers were in *poor* condition (score <100). Statewide habitat scores showed that 52% were in *fair* condition and 43 % were in *good* condition (score >150).

Sediment deposition appeared to have the largest impact on stream habitat with 43% of the stream kilometers receiving *poor* scores. Riparian buffers were better than expected and is probably a result of sampling randomly chosen sites, some of which can be remote, rather than targeting easy-access stations.



BENTHIC MACROINVERTEBRATES

DEQ's *Draft* Stream Condition Index was used as a preliminary assessment tool for probabilistic benthic community condition. *Good*, *fair*, and *poor* designations were assigned to SCI scores of >60, 40-60, and <40 respectively. Overall, 75% of the Commonwealth's stream kilometers were graded as *good* or *fair*.



A substantial difference was found between the mountain and piedmont ecoregion assessments. Approximately 50% of the stream kilometers in the mountains received *good* SCI scores compared to only 28% in the Piedmont. As DEQ's probabilistic dataset increases, the SCI will become more refined and will potentially show that adjusted metric scores are needed for the Piedmont Ecoregion.